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ABSTRACT

This workbook presents guidelines and information on the use of cooperative learning (an instructional technique that requires students to work together in small, fixed groups on a structured learning task) and the development and implementation of student learning teams in postsecondary education. The workbook covers: (1) a definition of cooperative learning, evidence of its importance as an educational strategy for college instruction, and the advantages of applying cooperative learning at the college level; (2) features that characterize cooperative learning (e.g., positive interdependence and individual accountability); (3) the issues and decisions that need to be considered before beginning the first class meeting using a cooperative learning approach; (4) experimental applications of cooperative learning that can be implemented while still maintaining the classroom structure; (5) incorporation of cooperative learning strategies into classes which use more traditional formats such as lecture and discussion; (6) concerns about cooperative learning; and (7) an analytic review and synthesis of the key instructional elements which characterize the cooperative learning method and contribute to its educational effectiveness. Appendices include a sample of cooperative learning exercises in the area of research methods in education. Contains a 70-item bibliography. (GLR).

# COOPERATIVE LEARNING AND COLLEGE INSTRUCTION

## Effective Use of Student Learning Teams

James Cooper • Susan Prescott • Lenora Cook • Lyle Smith
Randall Mueck • Joseph Cuseo

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# COOPERATIVE LEARNING AND COLLEGE INSTRUCTION

## Effective Use of Student Learning Teams

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The authors dedicate this text to
Mrs. Bernadette Cooper

The creation of this workbook truly has been a cooperative effort. Although all the authors made contributions to each chapter and to the editing and formatting of the text, I would like to acknowledge those having primary responsibility for each one: Joe Cuseo, Chapters 1 and 7; Susan Prescott, Chapters 2 and 6; James Cooper, Chapters 3 and 4; and Lenora Cook, Chapter 5 and editor of early text drafts. Lyle Smith edited the final draft of this work. Randall Mueck assisted in the areas of data collection and computer formatting of the text. My thanks go to them for their efforts in producing this workbook and for their support of cooperative learning at California State University Dominguez Hills over the last five years.

I serve as coordinator of the Cooperative Learning Users' Group (affectionately known as CLUG) at Dominguez Hills. CLUG, a group of faculty from all schools within the university, meets on a monthly basis to discuss research and practice in cooperative learning at the college level. We have studied the impact of cooperative learning on over 1,500 students exposed to this technique over the past two years.

Persons interested in finding out more about cooperative learning and/or CLUG are invited to contact any of the authors at the addresses and phone numbers listed in NOTES at the end of the workbook. For those interested in joining the International Association for the Study of Cooperation in Education, the professional organization of persons interested in cooperative learning research and practice, membership information can be found in NOTES.

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James Cooper
May 1990

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# The Case for Cooperative Learning in the College Classroom

Cooperative learning is an instructional technique that requires students to work together in small, fixed groups on a structured learning task. This definition of cooperative learning has evolved from the work of such psychologists as Johnson and Johnson (1975, 1987) and Slavin (1987). Considerable evidence exists in support of cooperative learning as a viable educational strategy for college instruction. The advantages of applying cooperative learning at the college level will serve as focal points for the remainder of this chapter.

## Developing Higher-Level Thinking Skills

Recent national commissions and scholarly reports on the status of contemporary higher education have consistently criticized the college experience for its failure to actively involve students in the learning process (National Institute of Education, 1984; Association of American Colleges, 1985; Bok, 1986; Boyer, 1987; Task Group on General Education, 1988). In his report on higher education, Bok concluded:

> *The vast and rapidly growing accumulation of information and knowledge has implications at all levels of education. In the colleges, the most apparent need is to change the emphasis of instruction away from transmitting fixed bodies of information toward preparing students to engage in a continuing acquisition of knowledge and understanding. . . . In terms of pedagogy, the preparation for continuous learning implies a shift toward more active forms of instruction. . . . It is time, therefore, to think seriously about multiplying the opportunities for students to reason carefully about challenging problems under careful supervision. Such an effort will presumably call for greater emphasis on promoting active discussion in class . . . (p. 165).*

This oft-cited failure to more actively engage college students in the learning process may be due, in large measure, to an over-reliance on the lecture method in higher education—a method resulting in long periods of uninterrupted teacher-centered, expository discourse which relegates students to the role of passive "spectators" in the college classroom.

When college instructors attempt to solicit student involvement or participation through questioning, such attempts elicit a student response only 50 percent of the time (Barnes, 1980). Furthermore, close to two-thirds of all teacher-posed questions called for responses involving rote memory rather than higher-level thinking skills (Barnes, 1983). When teachers manage to obtain active student participation, a very small minority

of students tend to dominate. In classes of less than 40 students, 4-5 students account for 75 percent of all interactions and, in classes with more than 40 students, 2-3 students account for over half the exchanges (Karp and Yoels, 1987).

Cooperative learning procedures may provide an antidote to these disturbing findings by enabling all students to become more involved with the course material and with each other as they actively work together in small groups. Bligh (1972) reviewed close to 100 studies conducted at the college level over a 50-year period. He found that students who become involved in active discussion of their ideas with other students are more likely to have less irrelevant or distracting thoughts and spend more time synthesizing and integrating concepts than students who listen to lectures. "All these comparisons are statistically significant and suggest during discussion students are more attentive, active and thoughtful than during lectures" (Bligh, p. 33).

Kulik and Kulik (1979) also conducted a comprehensive review of research literature designed to assess the effectiveness of different college teaching strategies. They found that student discussion groups were significantly more effective for promoting students' problem-solving abilities than the traditional lecture method. Smith (1977, 1980) observed college classes in a variety of disciplines and found that student-student interaction was positively related to critical thinking outcomes and to study habits characterized by more active thinking and less rote memorization.

More recently, McKeachie (1987, 1988) reviewed the research literature on college teaching methods and discovered that students are more likely to acquire critical thinking skills and metacognitive learning strategies such as self-monitoring and learning-how-to-learn from other students with whom they've interacted in group settings, rather than from listening to lectures individually. McKeachie concluded:

> *Our survey of teaching methods suggests that . . . if we want students to become more effective in meaningful learning and thinking, they need to spend more time in active, meaningful learning and thinking—not just sitting and passively receiving information (1986, p. 77).*

It is worth noting that the poor performance of American high school and college students in recent years on such standardized tests as the SAT and GRE has been due, in part, to students' ineffective use of higher-level thinking and problem-solving skills (A Nation at Risk, 1983; Adelman, 1986).

## Promoting Student Learning And Academic Achievement

Cooperative learning procedures are more effective for promoting student learning and achievement than traditional instructional methods which involve private, individual, and/or competitive procedures (Johnson et al., 1981; Slavin et al., 1985).

At the college level, Dansereau (1983) conducted research on a sample of over 200 students and found that cooperative learning arrangements were consistently more effective than "individual" learning methods for promoting retention of course information. Also at the college level, Frierson (1986) found that black nursing students scored higher on a state board exam when they were instructed to engage in cooperative learning and studying, relative to a comparable group of

students who were not instructed to engage in such interdependent learning. Treisman (1985) studied the effect of cooperative learning on black students at Berkeley entering college as math or science majors. He found that blacks participating in his cooperatively taught tutorial sessions received a mean grade average of 2.6 in freshman calculus; whereas a comparable group of blacks not attending these sessions had a 1.5 grade point average.

## Increasing Student Retention

Synthesizing a large body of retention research, Tinto (1975) concluded that the greater the degree of students' involvement in their college learning experience, the more likely they were to persist to graduation. Astin (1985) found, on the basis of research conducted over a 10-year period, that student involvement academically and socially in the college experience was the "cornerstone" of persistence and achievement. Active involvement in the learning experience is especially critical for "withdrawal-prone" students, such as disadvantaged minorities, who have been found to be particularly passive in academic settings (Astin et al., 1972). Unfortunately, the most prevalent instructional technique used in higher education, the lecture, may be very ineffective for actively engaging and involving such reticent students. The National Institute of Education's report on American higher education (1984) found:

> *Traditional classroom teaching practices in higher education favor the assertive student. But our analysis indicates that instructors should give greater attention to the passive or reticent student.... Passivity is an important warning sign that may reflect a lack of involvement that impedes the learning process and leads to unnecessary attrition (p. 23).*

Cooperative learning procedures serve as one effective mechanism for counteracting the passivity of reticent students by encouraging active involvement and participation within the sanctuary of a small, supportive group of non-competitive peers.

Empirical support for the beneficial impact of in-class, small-group interaction on reducing student attrition has been provided by Wales and Sager (1978) who collected data at the University of West Virginia. Their data indicated that students exposed to the "guided design" approach to learning, in which small groups of 4-7 students worked on open-ended problems, were more likely to display lower rates of attrition and higher rates of academic achievement than those not involved in the group learning approach. Also, Treisman (1985) found that the five-year retention rates for black students majoring in math or science at Berkeley who were involved in cooperative learning workshops was 65 percent, compared to 41 percent for blacks not involved. The percentage of blacks involved in cooperative learning experiences who graduated in mathematics-based majors was 44 percent—compared to only 10 percent for a control group of black students not involved in cooperative learning experiences.

## Enhancing Student Satisfaction with the Learning Experience and Promoting Positive Attitudes Toward the Subject Matter

After reviewing and synthesizing the results of nearly 100 studies at the college level, Bligh (1972) found that students who had in-class opportunities to actively interact with the instructor and with each other reported significantly higher levels of satisfaction with their learning experience than students in classes taught exclusively by the lecture method. Kulik and Kulik (1979) reached a similar conclusion in their comprehensive literature review, reporting that students involved in classes which made use of discussion groups were more likely to result in the development of positive student attitudes toward the subject matter of the course.

## Developing Student Skill in Oral Communication

Fear of public speaking is extremely common among the general population of adolescents and adults (Motley, 1988). College students in particular frequently experience "communication apprehension" in the classroom (Bowers, 1986). Such speech anxiety can be significantly reduced if students are given the opportunity to first express themselves in the more comfortable social context of a small group of peers (Neer, 1987).

Cooperative learning opportunities, therefore, would be especially valuable for English-as-a-Second-Language (ESL) students who have significant oral communication fears, even after graduating from ESL programs and enrolling in regular classes. The opportunity for these students to further develop their English-speaking skills in the context of a small supportive group of peers could serve as an alternative to the traditional oral report. Cooperative learning may provide a more effective and less anxiety-provoking opportunity for ESL students to gain further fluency and confidence in their English-speaking skills which, in turn, could benefit them in other college classes that require public speaking and in their professional lives after college.

## Developing Students' Social Skills

Developing students' social interaction is an important career-related liberal arts skill valued by employers and by faculty members in a variety of disciplines (Breen, 1981). Cooperative learning allows individual students the opportunity to work with others on a shared task, in pursuit of a common goal. This helps students to develop the types of human relations skills such as active listening, empathy, consensus building, leadership, constructive conflict management, and resolution, skills which are relevant and transferable to the sorts of social situations encountered in their future careers. A recent report on higher education published by the Association of American Colleges underscores the importance of modifying traditional instructional techniques to provide today's college students with the opportunity to become more altruistic and cooperative:

> *Recent descriptions of college students have berated their self-centeredness and even narcissism. Yet our educational institutions encourage many campus practices that make learning a private activity (Task Group on General Education, 1988, p. 35).*

## Promoting Student Self-Esteem

Cooperative learning has a more positive impact on student self-esteem than traditional methods of instruction (Johnson and Johnson, 1987; Slavin, 1987). Though the exact reason why cooperative learning has such a positive effect on self-esteem has not been established, it is possible that this learning method instills students with confidence that they can "act" on their own knowledge, articulate their knowledge, and assume control of their own learning—all of which develop within the context of a supportive, non-threatening peer group. Furthermore, the opportunity to help others learn may also serve to enhance individual students' own sense of self-efficacy and self-worth.

Promoting students' "personal development," including affective outcomes such as self-esteem, is a frequently cited goal of general education (Cross, 1982). Cooperative learning may be one effective mechanism for realizing this general educational objective.

## Promoting Positive Race Relations

Slavin (1980) reviewed a large number of precollegiate field studies in which cooperative learning techniques were used, concluding that such techniques "have strong and consistent effects on relationships between black, white, and Mexican-American students" (p. 337). He argued that this may be the most important outcome of cooperative learning because other research, conducted nationwide at the precollegiate level (Forehand et al., 1976), indicates that:

> *teacher workshops, multiethnic texts, and classroom discussion of race relations had very few effects on students' racial attitudes and behaviors. On the other hand, assignment of students of different races to work with each other and participation of students on multiracial sports teams had strong and consistent effects on race relations (p. 336).*

Promoting positive race relations is an especially relevant objective for contemporary higher education, given that colleges are now witnessing an increasing number of international students on their campuses (Scully, 1981) and an increasing proportion of black students are now attending predominantly white colleges (National Center for Educational Statistics, 1984).

In the light of the aforementioned evidence supporting the effectiveness of cooperative learning, college professors should be adding this technique to their teaching repertoire—as an instructional option which would serve to complement more traditional pedagogical methods rather than to supplant or replace them.

# Critical Features of Cooperative Learning

Although there is some discussion within the cooperative learning literature concerning which features distinguish the technique from other forms of instruction, the following features appear to characterize most applications of the technique at both the collegiate and precollegiate levels:

## Positive Interdependence

Students in cooperatively taught classes must be made to feel that "we sink or swim together." Teachers need to make it clear that each student is responsible to himself and to his team and that each student has an obligation to learn the material and to try to ensure that all teammates learn it, too.

Some instructors find that setting initial clear expectations for helping and supporting teammates is sufficient. Others design structures to increase the likelihood of interdependent effort. Some of these include:

- assigning roles such as team captain, recorder, or spokesperson;
- assigning activities with different subsections for each team member to do, followed by team sharing for consensus and correcting;
- utilizing incentives such as a point for each team member upon successful completion of each team practice activity or points for presentation of a unique point of view, correct solution, or summary of information to the total class;
- asking students to reflect orally or in writing upon the impact that team practice and dialogue had on each person's performance.

## Individual Accountability

Students appear to be most motivated to learn cooperatively when they are assured that their test and course grades will remain a true reflection of their individual effort. An attitude of resentment toward less able learners may occur if a group grade threatens to lower the more able students' achievement records. Therefore, while practice sessions should be cooperative, most evaluation needs to occur on an individual basis. The grading system must be criterion- rather than norm-referenced. Everyone who meets preset criteria must be able to earn a high grade; students should not have the perception that while they are cooperating within the team or class on certain activities, they are actually competing with each other for a limited number of good grades. Robert Slavin reports that explicit incentives to ensure positive interdependence and individual accountability are essential if achievement (as opposed to attitude) gains are to be observed in cooperatively taught classrooms. This observation is based on research at the precollegiate level and needs to be tested at the college level.

## Appropriate Rationale for Grouping

Most of the researched benefits of learning teams have been based on groups that were heterogeneous in ability and ethnicity. This is an effective strategy, but some courses may reflect a need for groups to be based on common interests or preferences, varied personality types, or a balance of specific skills. The composition of the learning teams needs to correspond to the instructor's learning goals for students. Historically, at the university level, students are grouped together temporarily for one specific project. However, positive effects in achievement and attitude appear to be linked to longer term groupings. Team members who work together for the semester appear to emotionally bond in ways that are unlikely to occur in short-term groupings.

## Structured Student Interaction

All cooperative learning approaches feature a commitment to regular in-class practice sessions where students must work together to solve a problem, master a skill, or analyze information. Some balance is desired between the time in which students are mainly passive receivers of information (e.g., lecture, discussion, film, and so forth) and active responders to and interpreters of the new learning. The instructor should design and structure practice activities which result in the following: a focus closely aligned with desired learning outcomes for the course; maximum student involvement and participation; and opportunity for teacher supervision and feedback. The most successful practice activities are highly structured with clear directions and procedures. Even those that require creativity and critical thinking need to be designed in such a way that team members are confident about the criteria for successful completion and understand the guidelines for how each member is to participate. Faculty indicate that ambiguous activities waste valuable learning time as students struggle to decipher the teacher's expectations. Even graduate-level students were found to be grateful for clear procedures spelled out on a ditto sheet or overhead projector.

## Teacher as Facilitator

Here is an opportunity for the instructor to assume the role of coach. As teams progress through their assigned activities, the teacher can observe, encourage, and intervene to provide requested clarification, offer encouragement, ask questions to stimulate deeper thought, or redirect efforts as needed. In most cooperative learning activities, students must perceive their peers as the major resource, and the instructor must avoid the temptation to provide immediate answers. Teachers should intervene only when the team has run out of ideas and cannot proceed without external prompts.

## Attention to Social Skills

Even at the university level, students arrive with varying degrees of communication skills. Instructors who use cooperative learning have reported that the following skills are often lacking: tolerant listening, constructive disagreement, thought eliciting, seeking clarification and assistance, and summarizing. A limited number of social skills should be listed on the course syllabus as requirements for completing the course. At times, such skills as active listening or constructive disagreement may actually have to be modeled. It is often a good idea to find a team exemplifying one of the appropriate social skills, then commenting on it, either to the team or to the entire class. Some professors report that brief, periodic self-assessment surveys were helpful as was allowing teams the opportunity to occasionally reflect together on their group 1 = 1 process strengths and weaknesses. When students become more conscious of their ability to interact and their impact on others, positive changes in group process are more likely to occur.

# Organizing the Classroom for Cooperative Learning

For a well-organized cooperative learning classroom, a variety of issues and decisions need to be considered well in advance of the first class meeting. Except in rare cases, most of the suggestions are based on instructor experiences rather than empirically verified research. As the research base becomes more definitive, the resolutions to the problems and issues described below will be made on increasingly objective and empirical grounds. Ultimately, an instructor who is considering applying cooperative learning strategies should develop procedures based on the specific student population taught, the educational objectives to be mastered, and the best available research.

## Forming Teams

As noted in Chapter 2, researchers and practitioners in cooperative learning mainly group their cooperative learning teams in a heterogeneous manner. They usually utilize some form of achievement measure to form teams, such as GPA or test performance. However, one may want to form heterogeneous groups based on other criteria, for example, racial/ethnic differences, class standing (upperclassmen versus lowerclassmen), sex differences, academic major, and so forth. Random assignment of students or students' self-selection of teammates is less effective than when the instructor determines groupings. A random or self-selection of teams has the risk of forming a group or two of less-motivated students, a circumstance which can create management problems for the entire class. A critical mass of two or three good students within each team tends to override the problems of one less able student. If two or more problem students are discovered in a four- to five-person team, the instructor should feel free to reform teams to keep a majority of good students in each team. In introducing cooperative learning to classes, the instructor should tell students that some team groupings may be adjusted at the instructor's discretion.

At certain times the instructor may wish to form homogeneous teams. For example, in methods classes for students studying to become secondary teachers, teams are often based on subject area preparation (math majors together, science together, and so forth). Instructors need to determine what educational outcomes they are trying to foster in their groups, then form teams accordingly.

*Size of teams.* The research is not entirely clear, but the authors' experience seems to indicate that four or five is the best number. If the group is larger than five, each person does not have sufficient opportunity to interact and practice skills which make cooperative learning superior to large-group lecture and lecture-discussion. Smaller groups tend not to supply adequate diversity of opinion and experience. On occasion, the use of "partner pairs" within a team experience is appropriate.

*Stability of teams.* Teams should stay together long enough for some kind of emotional bonding to occur. A period of 4 to 16 meetings may be the range of reasonable grouping periods. One might consider switching the teams once per quarter or semester; then, based on student evaluations and one's own observations, modify one's procedure from this standard. Many practitioners keep the same teams for an entire semester.

## Team Building

The instructor may wish to provide one or more brief team-building activities prior to giving groups more academically oriented tasks to perform. One possible team-building task at the beginning of the semester involves the instructor sharing with his students some personal information, including the colleges he attended, professional interests/experiences and favorite sports teams. Then each team member shares similar information within the team. Following this brief exercise, students are required to give themselves a team name (which often becomes the source of humor or a rallying cry for the members when they have performed well on a task). Other team-building activities include having pairs of students interview each other for a few minutes, then having one member of the pair introduce the other member to his team or to the entire class. A few minutes of this sort of activity can break down barriers and quicken the rate at which the members develop a sense of caring for one another. This developing of a bond between students improves retention rates in college (Tinto, 1987). Thus, team building is recommended at all levels of instruction. It need not take more than 10 to 30 minutes per term.

## Grading

Individual accountability has previously been identified as a critical dimension in cooperative learning. A related issue is that of criterion-referenced grading. If students know that they will be "graded on the curve" (norm-referenced), they will not be as apt to help their fellow students do well. On the other hand, if some absolute or criterion-referenced grading standard is used, then helping others will not imperil any student's grade.

Slavin (1983) indicates that one must grade each team member for improvement in his or her score relative to prior test scores and that this

improvement score should benefit the entire team in the pursuit of a course grade or other reward. He asserts that the K-12 level students need this direct reinforcer for helping their teammates to improve. The research at the collegiate level is not clear on this point. One college-level instructor (as suggested earlier) gives a few bonus points toward total course grade when students demonstrate productive team effort on at least 90 percent of their cooperative learning exercises. In order to award credit, at the end of each cooperative learning exercise, the instructor examines the single work sheet completed by each group for correctness and assesses how hard the group has been working on the task, based on his monitoring during the team activities. Then members of successful teams are told to give themselves a point for that day's exercise. The accumulation of nine such team learning points in 10 cooperative learning exercises allows students to add two points to one of their test scores, perhaps raising that grade from a B- to a B. Students keep track of their own team learning points by recording them on personal attendance/points charts. While not all faculty will want to examine a group's completed work for bonus credit, it is certainly one incentive for productive group effort.

At the collegiate level, participation in the cooperative learning groups seems to be sufficiently self-motivating that extrinsic reinforcers such as grades may not be critical to motivate students in groups. The group work is intrinsically reinforcing as long as criterion-referenced grading and individual accountability are components of the cooperative learning system and the tasks performed in the groups are perceived as meaningful to the students, not just busywork assigned so that the instructor will not have to lecture.

## Social Skills

As noted earlier, such techniques as listening actively, expressing the need for assistance, and learning how to disagree with an idea without attacking the person are important competencies which most students, precollegiate and collegiate, do not seem to possess. Therefore, some description of appropriate cooperative behavior, given early in the term, is needed to get the groups started positively. During the term, the instructor needs to listen for signs of appropriate cooperative behavior while monitoring cooperative learning groups in action and comment to the class as needed on appropriate and inappropriate social skills, without identifying transgressors by name.

## Processing

Processing is a technique that is commonly used in cooperative learning classrooms at the precollegiate level. It involves asking groups members to reflect on their behavior during group work and evaluate the team's performance with respect to some criteria of appropriate behavior. For example, each group might be asked to assess the extent to which team members made an attempt to contribute to that day's activities and the extent to which team members respected the opinion of the other members and listened actively to what each member said without interrupting. Student responses may be completed in writing and shared immediately with other group members, or the written responses might be submitted to the instructor for feedback later to the group or just for a formative evaluation of the group process. At the very least the instructor should occasionally take group members aside before or after class and inquire about their groups. Things which may not be obvious in monitoring eight or more groups during cooperative learning work may emerge during this informal formative evaluation, allowing remedies to be applied before the problems become serious. And the knowledge that the instructor has an interest in social skills is often enough to produce the desired effect.

## "Shaping" Group Assignments

Early assignments in cooperative learning should be simpler than later assignments in order to assure group success. Some simple recognition of correct and incorrect exemplars of concepts that the students have just read about or heard in lecture might be appropriate early in the term. As the term proceeds and students have experienced success in their groups and have learned how to work constructively with their teammates, much more complicated and divergent thinking is recommended. For example, in a research methods course, one instructor begins the term by having students simply recognize types of research designs and sampling procedures. Later, team members generate their own examples of these concepts. Near the end of the term, groups have to bring all these concepts together, designing complicated funding proposals for action-research projects to be submitted to another team. Submitted proposals are then evaluated by the other team and are funded in full, in part, or not funded at all, simulating a peer review process often used in grant submission. The cooperative learning assignments can thus be "shaped" from rather simple tasks, largely structured by the instructor, to more complicated assignments requiring more student decision making.

## Troubleshooting

If the cooperative learning procedures are well organized and well structured, there should be very little difficulty in getting students to engage in team learning. Organization and structure are the keys to successful group activities. Cooperative learning must be introduced with a brief rationale for the departure from more traditional teaching techniques. The cooperative learning activities and work sheets guiding student performance must be related to the overall course objectives. The method of assessing students' performance must be clear and fair. Problems are rare in a well-articulated cooperative learning program because students do seem to have an almost innate interest in interacting with their peers as an adjunct to more traditional lecture and lecture-discussion activities.

One problem sometimes encountered concerns the very rare student who approaches the instructor after the first cooperative learning session and says, "I came to this class to hear you talk, not to hear my fellow students share their ignorance." The best way to deal with this objection is to indicate the research support in the college teaching literature that affirms that all students gain by using cooperative learning. Since this student is usually one of the more able in class, actual studies can be cited. Another technique is to ask the complaining student to try two additional sessions of cooperative learning work and, if the student is still dissatisfied, to indicate that the student can transfer to a more traditionally taught class or be able to work alone. Once students become involved in cooperative groups, these complaints typically disappear. It is important that the use of cooperative learning be described on the first day of class so that totally antagonistic students may choose to find another class. This has never happened to the current authors.

Another possible problem concerns a troublesome student within a cooperative learning group. A few simple rules stated at the beginning of the year concerning appropriate behavior in groups should take care of most problems (see appendix A for sample rules). The group dominator, who wants to do most of the talking in the cooperative learning groups and who generally feels that he or she knows most of the answers, is best handled by taking that person aside quietly when the problem first occurs and reminding the student that in cooperative learning all group members are to contribute in roughly equal measure. If the problem occurs again during the cooperative learning session, a reminder in the group setting may be in order. If there is a team leader or other person assigned to ensure equal participation of group members, suggest to that person that it is his or her job to monitor this. A similar intervention may be required for the nonparticipant. Occasionally, it may be necessary to change group structures to resolve individual problems within a team. This should be a last resort, a solution taken after other possibilities have been exhausted. Group members need to be reminded that virtually all jobs and professions require the ability to work cooperatively with others, even if they are not personally attracted to some individuals.

The instructor's walking around and constantly monitoring group dynamics during cooperative learning activities can head off most problems. And if the groups have a serious academic task that is well planned and clearly structured, that is perceived as interesting and tied to the course objectives, most students will immerse themselves in the business at hand rather than dwell on personality conflicts with other group members.

# Getting Started in Cooperative Learning

There are a number of ways of experimenting with cooperative learning while still maintaining the classroom structures with which most instructors feel comfortable. If these experiments are initially tried with positive results, an instructor may wish to consider more extensive and sophisticated applications of cooperative learning. Not all of the procedures described here will meet all of the formal criteria for cooperative learning identified in earlier chapters. Some of these techniques might be termed "collaborative learning," a term that is sometimes used to designate group learning activities of almost any sort. Any successful use of cooperative or collaborative techniques must be carefully thought out and structured so that the educational outcomes are clear to the instructor and to the students. Once these rather simple applications are presented in this chapter, more complicated Cooperative Learning techniques will be outlined.

## Simple Applications

One rather simple application of collaborative learning in a traditional lecture or lecture-discussion class involves stopping regularly (around every 10-30 minutes) and asking pairs of adjoining students to reflect on what was just presented. Students might be asked to generate two real-world examples of concepts just presented or to develop one question which the pair feel has yet to be addressed in the class. At the end of the class, pairs or four-person teams might be asked to complete a cooperative "minute paper" where the team has a short period of time (one or two minutes) to write on a card the most important thing that was said that day and to also write one question which remains unanswered. The instructor can collect these cards and use them during the next class period. This procedure increases the likelihood that students will be active listeners during the lecture and also helps the lecturer assess the clarity, completeness, and effectiveness of the lecture.

Somewhat more complicated applications of cooperative learning involve reviews for exams. Just prior to an exam, the professor can break students into learning teams composed of a balance of high-, medium-, and low-achieving students. A review sheet can be given to the four members of the learning teams. The teams then have to reach consensus on the correct answers to the work sheet if the answers are "convergent"

(i.e., one correct answer such as finding the square root of a number or identifying the phylum for a particular animal). If the answers require divergent thinking, then members may be asked to provide more complicated answers which suggest a synthesis of several views or a listing of several reasonable alternative responses. For example, "What were the major themes in the short story just read?" or "Which side ultimately is in a more ethical position in the animal rights controversy?" The instructor may then have a recorder read or report the answers to the entire class for review and response. One often need not assign points toward course grade on these assignments. The tasks are usually so interesting to the students that additional incentives are unnecessary. At other times, just having the group work sheet available for use in preparing for the test is sufficient motivation for pupils to work cooperatively and intensively.

Another procedure similar to the preceding one can be used for homework assignments. For example, one university instructor gives a work sheet to students every two weeks, specifying written, short essay responses which must be completed outside of class during a specific time frame. The instructor lectures during most class meetings. Every two weeks, the instructor checks to ensure that class members have their written homework assignments completed and gives class time in small groups to discuss and/or revise the assignments. Those without the completed homework must work alone during this time period. Those students having completed work sheets go over their answers with their teammates and the team develops one preferred answer to each item. At the end of the period, team recorders read answers to each item and the class debates the quality of the answers. The team with the best answer receives a round of applause from the class. This procedure could easily be adapted to a number of content areas and courses.

A more extensive use of cooperative learning involves an educational research methods class which meets for three hours every week for a semester. The instructor lectures in the class for the first 90-120 minutes, then gives a ten-minute break. After the break, teams of four students complete a work sheet based on the lecture and on homework. In its simplest form, this technique could also be adapted to a wide variety of content areas and courses.

## Advanced Applications

There are over a dozen specific advanced cooperative learning techniques. Each may be particularly appropriate for a specific educational outcome, type of student and academic discipline.

*STAD (Student Teams-Achievement Division).* In this cooperative learning technique, students are given information via readings, lectures, films and so on. Then teams of four are assigned to complete a work sheet, solve a set of problems, etc., working collaboratively. Members of a team are usually heterogeneous in terms of knowledge of course content. As with all of the techniques listed in the Advanced Applications section of this chapter, students are usually heterogeneous on other dimensions such as sex, race and other factors determined by the teacher. After the team work, students are tested or otherwise evaluated individually to ensure that teammates tutor one another as the task is being completed. This is one of the most teacher-centered techniques since

the instructor usually determines the assignment, the composition of the groups, and most other aspects of the instructional sequence.

*Coop-Coop.* This technique is structured around a series of 1-1 team building techniques. The teacher assigns a common topic to all cooperative learning teams within the class and identifies a series of subtopics related to the main topic. Each student within a team selects one of the mini-topics, researches it and shares the information within the team. After group discussion, the information is compiled into a group presentation which is given to the entire class, either in written or oral form. Evaluation of the individual's social skills within the team is evaluated, as is his/her individual mini-topic work, which is submitted to the teacher in written form.

*Jigsaw.* Similar to Coop-Coop, except that each student is assigned a mini-topic by the teacher. The student researches the topic, then comes back to the class and discusses the mini-topic with members of other teams who were assigned the same mini-topic. Team members then go back to their original teams and share the mini-topic with teammates.

*Group Investigation.* Each team is assigned or selects a *different* issue within a very broad topic. Students are given enormous freedom in deciding how to organize their teams, conduct the research and present their findings to the total class. The emphasis is on higher level learning, applying and synthesizing ideas, and drawing inferences. Evaluation should cover both the team presentation and each individual's contribution to the teams. This is a highly student-structured approach, in contrast to STAD.

*Structured Controversy.* This is a technique in which pairs within a four-person team are assigned different sides of an ethical/moral issue. Each pair is assigned to research their side of the issue (or the teacher provides a written partial summary of each side of the issue if time is short). Then the pairs discuss the issue as a team. The purpose is not to defeat the other pair, but to simply develop as much information about the issue as possible. Once the team discussion is completed, the pairs are commonly asked to switch sides and develop arguments for the opposite position.

Note that one may mix and match elements of each of these techniques. You may also want to add your own elements to the techniques. All of the techniques share some features. All require some specification of the instructional goal or objective. All require some group work designed to teach something or to give practice in improving performance on a task. All require some form of individual assessment to determine each individual's skill independent of the group's performance.

The possibilities for applying cooperative learning in college classrooms are almost limitless. *The key to success in cooperative learning is for the user to identify clearly the learning objectives to be promoted using the cooperative technique and to plan and sequence the cooperative learning activity carefully to ensure success.*

# Fitting Cooperative Learning into Existing Teaching Styles

Formal use of cooperative learning can enhance existing teaching styles by providing opportunities for students to actively discuss, refine, and master academic material. It increases student motivation by affording occasions for mutual reinforcement without the often counterproductive behaviors elicited in student-student competition (Eble, 1988). Because it is a teaching strategy rather than a style, cooperative learning can be included easily in existing modes of teaching. This chapter will explain how cooperative learning strategies may be incorporated into classes which use more traditional formats. All of the strategies are predicated on the formation of stable, small groups or teams which embody the critical features explained in Chapter 2.

## Lecture

Lecture is the most common method of delivery in university classrooms. Among the advantages of the lecture technique are that it provides: a) up-to-date information, b) summaries of materials from a variety of printed sources, c) structures to help students read more effectively, and d) an instructional situation for auditory learners (McKeachie, 1980). Lectures may be of various lengths and delivery styles. Normally, an instructor uses notes as reference and answers student questions, either as the lecture progresses or at the end. At times the instructor may use visual aids to enhance his or her information or the teacher may provide an outline for student notes. Rarely in a lecture are students provided with access to materials, including handouts with descriptive material, concepts, examples, study-questions, and homework "problems." These materials, though, are necessary in a student-centered, small-group format such as cooperative learning (Smith, 1986). Some ways of using cooperative learning to combat some of the negative aspects of lecturing include:

*Focusing on important aspects of a lecture.* For students to focus on the important aspects of the lecture, instructors may provide framed outlines or study questions before a presentation. Working together in their cooperative groups, the class becomes prepared to integrate the forthcoming lecture into their prior knowledge. Working from a title or a topic sentence, cooperative groups can generate questions or predictions which can be

answered, altered, or verified at the end or midpoint of the lecture. This procedure gives students responsibility for their own learning while providing an opportunity for sharing prior experience concerning the topic of the lecture.

*Using cooperative learning during and after a lecture.* During and after a lecture, cooperative activities can be used to discuss material with other members of the small group. Cooperative learning necessitates face-to-face interaction among students. If the group shares a goal, such as producing a completed work sheet or a report, then positive interdependence can result from the cooperative learning activity. Therefore, the instructor needs to organize his or her lessons to include instructional materials as well as content. This can easily be accomplished as the lecture material is prepared. At times cooperative groups may generate their own materials, preparing study notes for future use from the lecture they have just heard.

*Breaking the material down.* Another way to use cooperative learning in a lecture is to break the material down into "mini" or "micro" talks of fifteen minutes or less. Students work together after each part of the lecture-synthesizing, practicing an instructor-explained skill, or in some way manipulating or applying the lecture material.

*Providing closure to a lecture.* Cooperative learning strategies provide closure to a lecture. Students should be able to discuss what they have heard, perhaps summarizing what they learned and deciding, with guidance from the instructor, how they might use this information in future lessons. The instructor can check on student understanding through the completion of an instructor-designed handout or by monitoring the groups as they discuss the material.

Many undergraduate classes, especially those of a survey nature, are large and may meet in an auditorium setting. Cooperative learning strategies are possible in such a situation, but may take some careful preparation and reassignment of seats to organize effectively. Students will need to be assigned to seating within the lecture hall; groups may need to be limited in size to four by the stricture of seating. Two persons would have to turn around in each group and activities must be organized to keep noise at a minimum. The overall benefits from these activities are such, though, that students should soon make the minor adjustments to this environment with ease.

## Discussion

Discussion-based instruction presumes that the students have mastered the material and are ready to apply their knowledge in an interactive process. This form of instruction is used mainly with small seminar-type classes taught at the upper-division or graduate level. In most cases, the instructor generates the topic of the discussion and may also be the facilitator as the discussion proceeds. An active mode of learning, discussion contains many of the attributes of learning groups without the interpersonal structure and small-group skills required in cooperative learning. However, research on the discussion technique reveals that often only two to five students actually involve themselves in the dialogue with the instructor (Karp and Yoels, 1987).

Implementing cooperative learning strategies in a discussion-based class assures that there will be greater student involvement and better student-student interaction by decreasing the possibility

of low levels of student response. By providing a chance (even requiring it) for the students to experiment with their ideas in cooperative learning groups, the instructor uses the positive interdependence among group members to assist the students in formalizing their ideas about the topic of the discussion. Smith (1986) found that his students learned "perspective-taking skills" through presentation and discussion of different perspectives on each issue in an environmental issues seminar. Split into pairs to examine conflicting ideas, information, conclusions, theories, or opinions, the cooperative teams in Smith's study then combined to try to achieve consensus, using cognitive procedures that the students saw modeled.

*Assigning student writing.* In classes where student writing assignments are required as formative or summative assessments, cooperative groups provide a place for peer response at all stages of the writing process. Initially, students within groups furnish assistance in such areas as topic selection, narrowing of focus, sequencing, and revising strategies. Because there is no formal teacher grading early in peer-group response, students are able to test, modify, and change their writings in a nonthreatening environment. Students may then submit their edited materials for grading purposes.

*Viewing videos/films.* Preparing students to look for themes and critical ideas in audio-visual presentations can follow the same format as prelecture cooperative group work, where the instructor provides a motivating handout which readies the students to integrate the main points of the audio-visual presentation into their prior knowledge. Tapping into prior knowledge by having the students answer anticipatory questions readies the students for directed listening, which unites the new material with that already learned, according to the desires of the instructor. Having the questions prior to viewing the presentation provides direction, assuring that the students will acquire what the instructor intends.

## Group Projects

Unstructured small groups unite for many reasons in university courses. Initiated by the instructor, these small groups usually are formed to complete a project of some type, perhaps a paper, a demonstration, or a performance. Different from formal cooperative learning, these student groups have only a product to develop collaboratively. Responsibilities within the group are not assigned by the instructor, nor is interdependence structured. Students are usually left to form their own groups and evolve a procedure independently. Although the projects or products of these teams may show group mastery, there is usually no individual accountability built into this learning mode. Individual accountability, a critical feature of cooperative learning strategies, can give an instructor multiple opportunities to assess student progress through formative evaluation procedures. In order to ensure that all the members of a group learn what the instructor wishes them to, each individual's performance needs to be assessed frequently (Astin, 1985). With only a group product, demonstration, or performance to be evaluated, there is no mechanism for individual accountability.

By using cooperative learning strategies within the group project format, the instructor assures that each person in the group has a specific task


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to perform; the instructor also can provide formative assessment procedures to evaluate individual student progress. These procedures can take the form of teammates' evaluations of one another (and/or themselves) or specific assignments given to individual group members. Group projects encourage communal efforts among students. Infusing cooperative learning strategies guarantees that each member of the group has the opportunity and the responsibility to learn and perform.

## Laboratory

One of the most active modes of teaching is the use of the laboratory or experimental environment, where students are empowered to carry on inquiry using the scientific method. Working in pairs or small groups, students investigate, prove, and formulate hypotheses with instructor direction and supervision. Another strategy is arranging the process like a jigsaw puzzle and giving each group member or pair one piece to be responsible for. In order for the experiment or report to be complete, all group members have to contribute and work together to incorporate their contributions (Smith, 1986).

Other cooperative strategies which can be used in laboratory settings include discussion of various findings among pairs grouped together by the instructor, generation of a report synthesized from findings of pairs grouped together, peer evaluations of findings within groups, and plans for future experimentation based on group collaboration.

# Concerns About Cooperative Learning

As new instructional strategies are implemented, it is natural to anticipate potential roadblocks that may interfere with success. The most frequently occurring concerns and the authors' responses to those concerns will be considered in the remainder of this chapter.

## I Am Concerned That I Won't Be Able to Cover as Much Material During the Semester

If some part of class is to be reserved for student-team practice sessions, it follows that the lecture cannot continue to be as extensive. However, when the focus of concern becomes students' mastery of critical concepts and skills versus instructor's coverage of curriculum, the price to pay seems minimal. While the use of cooperative learning activities necessitates a somewhat more stringent process of screening content, faculty also are encouraged to select material that has maximum transfer value, that is most directly related to the development of upcoming concepts, skills, or issues, and that is most in need of instructor explication and supervised student practice. University students gain immensely from the opportunity to practice new content and receive feedback immediately. In a cooperative team context students are encouraged to verbalize their thinking, to question each other, and to request and offer help until everyone has understood the new material to be learned. Reports indicate that students in cooperatively structured classes do have a deeper understanding of the material as evidenced by: a) the quality of questions directed to the instructor, b) the ability to make connections from the content under discussion to other content, c) increased ability to solve problems, and d) general academic achievement. Some instructors assign additional homework reading to compensate for less material being "covered" in class or they provide students with notes of material that the instructors cannot cover in class.

## It Will Take Time to Create the Team Practice Activities

Initially, team activities do take a little extra preparation time and effort. Some faculty report that they use their exams to guide the design of the in-class practice tasks. Once an instructor has sufficiently sharpened the focus of each class in order to determine a learning outcome that students can actually demonstrate together, the positive response and increased achievement which results cannot be ignored. Allowing students to keep the material completed in cooperative activities helps to ensure that students have a model of what issues are viewed as important by the teacher and helps students prepare for exams. Many concerned faculty members are intrigued with the challenge of providing students opportunities for frequent guided practice prior to the exam. Many instructors report that the cooperative learning activities provide them with a means to gauge student understanding as the teacher observes students while moving from team to team. This information can then be used to determine any need for further explanation with the whole class or with individual students or teams. Finally, the team learning provides a diagnostic for all students concerning their relative mastery of course content. In traditional lectures, poor students often do not perceive how little they know until it is too late to remediate this deficit. In cooperative learning, students receive early and frequent models concerning how they stand in the class in comparison with several other students.

## I Don't Have Time to Grade Each Team's Learning Task Each Time Class Meets

It is not necessary to grade these in-class assignments. The purpose of cooperative learning activities is often to provide an opportunity for guided practice, not to assign a grade. Inherent in each task is peer feedback regarding accuracy of results or adherence to criteria. Instructors can also provide answers for team self-correction if the task focus is convergent in nature (i.e., one correct answer). Some teachers assign each team member a minimal number of points for each task completed, while others feel that students are intrinsically motivated by this opportunity to master content and "rehearse" for exams. Although sharing results classwide is preferred, in large classes the instructor might have only a few groups share results and then provide oral feedback that the whole class can hear. Some instructors provide a work sheet for individual homework and then teams meet to give correction at the start of the next class meeting. In one class (described in an earlier chapter) this homework is a ticket that ensures access to the team meeting, which is viewed as an earned privilege.

It is important to remember that a critical feature of cooperative learning is individual accountability. Grades are earned by students on

their exams and projects, which are completed individually. If group projects are assigned, each student is held accountable and graded for his own contribution. Group grades can often result in tremendous anxiety for adult learners, especially those who fear that a grade may be lowered if one or two teammates are less knowledgeable or conscientious.

## Students May Think This Process Is Unusual or Irregular at the University Level

Actually, group problem solving closely reflects current procedures in the world of business, science, and government. The rationale for establishing interdependent networks must be provided at the beginning of the course. Colleagues report that when they stressed the purpose of cooperative learning and its potential benefits at the beginning of the course, students responded positively and no problems were reported. Some students have been trained to believe that education is an individual effort and may feel uncomfortable initially about sharing and/or seeking help. Instructors can carefully observe students as they work and intervene through brief private conferences as needed to provide encouragement and reset expectations for working with others.

## I Won't Be Able to Ensure That All Students on a Team Are Working and Participating in a Constructive Manner

Several strategies have been found that are helpful here. The instructor needs to set strong expectations during the first few weeks of team learning. When students know that their participation is required and that they will be closely observed and monitored, most respond enthusiastically. Some instructors informally ask students privately how well their group is working and then offer personalized advice and encouragement. Other instructors provide time for teams to assess cooperative skills in order to help students become more conscious of their own communication processes and work habits. Some instructors ask students to contact them by written notes to indicate that intervention is needed, although students rarely choose to implement this strategy.

## I Am Not Sure When to Schedule Team Practice Sessions and What Kinds of Activities to Design

There is no single solution to this concern. Instructors vary occasions when they have teams meet and for how long. Some teams meet at the beginning of class to share homework results or answer questions that focus on content from the last class session. Others reserve team practice for the last part of class so that students have an opportunity to practice salient information from the instructor's lecture/discussion. Team work also can take place at several intervals during instruction so that students can immediately think about each important concept as it is presented. The type of practice activity varies widely with the instructor's lesson objective and type of course content. Activities can include: a set of questions to be answered, a dialogue to be written, problems to solve, essays to analyze for bias or intended message, comparison charts, critiques, experiment design, reaching consensus on answers, creation of a product, and so forth. *The most successful activities are always highly structured and have very clear directions and expectations for how team members are to contribute and interact.*

# Effective Educational Principles Implemented by Cooperative Learning

This chapter will provide an analytic review and synthesis of the key instructional elements which characterize the cooperative learning method and contribute to its educational effectiveness. A close analysis of the component procedures comprising cooperative learning reveals that a large number of powerful teaching and learning principles are effectively implemented by this instructional method.

## Active Involvement in Learning

In contrast to the instructor-centered lecture method which often places students in the position of being passive recipients of information, the student-centered cooperative learning method requires the learner to "act" on the information received. Thus, students become involved in a learning process which encourages them to personally reflect on course material and relate it to their existing knowledge structures, as well as requiring students to articulate and justify their covert reflections via overt communication with their peers. Furthermore, by carefully selecting the process and content of the students' cooperative learning task, the instructor can assure that their covert and overt cognitive activities are focused on "higher-order" thinking skills such as application, evaluation. and/or synthesis.

Active student involvement promotes critical thinking. McKeachie et al. (1987) recently conducted a comprehensive review of the college teaching and learning literature, concluding that "student participation, instructor encouragement, and student-to-student interaction positively relate to improved critical thinking" (p. 1). Cooperative learning incorporates all of these principles McKeachie found to be associated with the development of critical thinking—a cognitive skill that is frequently cited as a major goal of general or liberal education. In *Teaching Thinking Across the Curriculum*, Ruggiero (1988) argues that the explicit teaching of higher-level thinking skills should not detract from the time and effort instructors spend on teaching their own subject matter. "The only significant change that is required is a change in teaching *methodology*" (p. 12). Cooperative learning represents such a methodological change, one that effectively enables college instructors, in all disciplines, to achieve the important general-educational goal of developing students' critical-thinking skills.

## Monitoring of Student Comprehension

Empirical support for the importance of effectively monitoring student comprehension is provided by Rosenshine and Stevens (1986), who reviewed a large body of well-controlled research on teaching effectiveness at the pre-collegiate level. They found "checking for comprehension" to be one specific teaching behavior that was significantly associated with higher levels of student learning and achievement. At the college level, Wilson (1987) conducted a three year, teaching-improvement study as part of a faculty development program, and found that the teaching item which faculty received the most assistance on was "knows if the class is understanding him/her or not."

> *This item is related to the importance of getting feedback from students and is highly correlated with overall effectiveness as an instructor. The greatest number of both faculty clients and their students saw this as an aspect of teaching with which faculty needed help (p. 18).*

Cooperative learning enables the instructor to obtain feedback while circulating among the small groups, hearing students comments, and answering student questions. This represents an effective instructional strategy for increasing instructor knowledge of whether or not the class is understanding. Furthermore, cooperative learning should increase the likelihood that individual students will seek feedback from their instructor because the student-instructor interaction is much less formal when the instructor functions as roving facilitator, and the surrounding group size is much smaller than would be true of the lecture situation.

Students are more likely to seek feedback from instructors in small-group settings. Stones (1970) surveyed over 1,000 college students and reported that 60 percent of the students said the presence of a large number of people would deter them from asking questions, even if the instructor encouraged them to do so. Thus, it may be expected that cooperative learning procedures would result in instructors' receiving more questions and comments from individual students. Such student feedback could provide the instructor with a rich source of teacher-improvement information.

## Principles of Information-Processing and Memory

Rehearsal of information soon after it has been received or processed results in greater retention of that information (Broadbent, 1970; Atkinson & Shiffrin, 1971). The rate of human forgetting is sharpest immediately after the information is received. However, if information is rehearsed soon after its reception, then the brain has an opportunity to consolidate or lock in the memory trace and offset the rapid rate of forgetting which normally follows just-processed information.

The formation of cooperative learning groups for purposes of actively discussing information

that has just been processed by the students serves to provide them with an effective opportunity to rehearse and consolidate this information before it is forgotten. As Bligh (1972) notes,

> *'I understood it at the time, but I don't now,' is not an uncommon remark from students.... What was required was some* consolidation *of the learning and understanding that took place.... buzz groups have a particularly important role because they may take place immediately following the initial learning situation such as lecture, and before substantial forgetting takes place (p. 188).*

During long periods of uninterrupted information-processing such as an hour-long lecture, two types of memory interference build up to cause forgetting: retroactive interference when the information processed toward the end of the lecture interferes with the retention of information processed at the beginning of the lecture; and proactive interference when the information processed at the beginning of the lecture interferes with the retention of information processed at the end of the lecture (Keppel & Underwood, 1962; Waugh & Norman, 1965).

If cooperative learning opportunities are incorporated into the class session, such long periods of uninterrupted listening and information-processing can be avoided; thus, retroactive and proactive interference would be minimized and students' retention of lecture information would be enhanced.

## Peer Learning and Peer Teaching

The value of peers for promoting individual students' learning is a long-standing educational recommendation. Levin, Glass and Meister (1984) provide empirical evidence underscoring the educational effectiveness and efficiency of peer learning/teaching. They reviewed the research literature, comparing the cost-effectiveness of four academic support strategies for developing students' mathematical and reading skills: peer tutoring, computer-assisted instruction, lengthened instructional time, and reduced class size. They found peer tutoring to be the most cost-effective support strategy. Furthermore, the peer learner is not the only one who profits from the experience; those who serve as peer instructors experience cognitive benefits as well (Benware and Deci, 1984).

The opportunity to get access to other students' perspectives and to learn from other students, rather than the instructor, may be especially important for promoting the cognitive development of beginning college students. Recent high school graduates often enter college at a first stage of cognitive development (Perry, 1970). This stage is characterized by two dispositions:

1. Students see the world in polar terms, right or wrong. Right answers are absolute and known by an authority such as the instructor whose job is to teach them this absolute truth.

2. Students see as bothersome multiple viewpoints and diversity of opinion such as differing theories or methodological approaches, for they represent unwarranted confusion generated by unqualified authorities (Perry, 1970).

Cooperative learning procedures may be effective for promoting students' progress to more advanced stages of cognitive development by making learning less instructor centered, thereby reducing student perceptions of the instructor as the absolute authority; and by exposing students

to the perspectives of other students, thereby increasing their appreciation for multiple viewpoints and methods of inquiry.

Furthermore, effective learning strategies acquired from peers during in-class activities tend to positively transfer or "spill over" to students' out-of-class study strategies (Lambiotte et al., 1987). Thus, cooperative learning procedures could serve to increase the effectiveness of the peer teaching-learning process, both inside and outside the classroom.

## Principles of Human Motivation

The learner-centered focus of cooperative learning provides students with some element of control in the classroom and gives them some decision-making opportunities. Increasing individuals' feelings of control over a task serves to increase their intrinsic motivation to perform that task and to reduce their anxiety about performing that task (Thompson, 1981). Also, increasing college students' decision-making opportunities in the classroom results in more positive student attitudes toward the subject matter of the course (Grasha, 1972).

By allowing students the opportunity to "act" on the information they are attempting to master, cooperative learning provides students with the opportunity to receive frequent and immediate feedback regarding their performance from their peer-group members and from their roving instructor. Frequent and immediate feedback serves to increase students' motivation to learn (Mackworth, 1970). College students are curious to find out about their test results as soon as possible, and they often have a strong need to know how they are doing or "where they stand" in class.

Cooperative learning procedures provide a periodic change in instructional format from the full-period lecture. Procedural novelty, variety in auditory stimulation, and change of postural position all serve to increase attention and motivation (Bligh, 1972). When used as a periodic alternative to the lecture method, cooperative learning can provide for such motivation-enhancing changes in instructional procedure, auditory stimulation, and postural position.

## Student Retention

The opportunity to work regularly in small groups promotes social involvement, integration, and bonding among students. These social-networking processes are strongly associated with higher rates of student retention (Tinto, 1987). In addition, cooperative learning procedures assure that students develop positive interdependence with other students during their interactions. This "sink or swim together" feature of cooperative learning serves to increase each individual student's commitment to the peer-learning group and, thereby, increases persistence to course completion by making each individual accountable for more than just his or her own success.

Opportunities for the instructor to visit with small groups during cooperative learning activities may allow for more informal, intimate interaction between instructor and students than would be true of the lecture method. Such informal interactions have a positive impact on student retention (Astin, 1977). Furthermore, these informal in-class interactions with the instructor may increase the likelihood that individual students or groups of students will seek such interaction outside of the classroom. The quantity and quality of out-of-class contact with faculty is strongly associated with student retention (Pascarella, 1980).

College students report that they are more satisfied with courses that allow them to engage in group discussion (Bligh, 1972; Kulik & Kulik, 1979). Noel (1985) indicates that students are more likely to stay in college if they are satisfied with their learning experiences. Cooperative learning allows for significant amounts of meaningful student discussion which should enhance their satisfaction with the learning experience and, in so doing, should promote student retention.

In addition to the retention-promoting benefit of group discussion, cooperative learning could also be expected to increase student satisfaction with the learning experience by enabling instructors to "know" their students better. In particular, the opportunity for the instructor to visit and interact with students on a small-group basis should better enable instructors to learn the names of individual students. "Addressing students by name" is a classroom teaching behavior that correlates significantly with students' overall satisfaction with the course and the instructor (Murray, 1985). Greater course satisfaction should enhance student retention.

Approximately one-half of all students who leave their college will do so during their freshman year (Terenzini, 1986), and many of these departures will take place during their first semester (Blanc et al., 1983). One factor which may be contributing to this disturbingly high rate of freshman attrition is the educational tradition of "herding" first-year college students into large, introductory general-education classes.

Cooperative learning groups may represent an effective instructional strategy to counteract the passive, impersonal, and anonymous nature of this "mass" education of freshmen, enhancing their retention by promoting individual students' active involvement in the learning process and by creating small, more intimate peer-support groups within large survey courses. Researchers surveyed 800 college students for their perceptions of what contributed most to their learning in large classes and found that the second most frequently cited factor was "other students" (Wulff et al., 1987). The authors of this study concluded: "Such a finding suggests that large-class instructors may want to think about ways to capitalize on collaboration possibilities in the large-class context" (p. 29). Cooperative learning would represent one such "collaboration" possibility for enhancing the learning and retention of students in large classes.

In conclusion, the cooperative learning process is comprised of a number of subprocesses and component procedures that implement a variety of effective teaching-learning principles which have been well documented by experimental research on human motivation, learning, information-processing, and memory; basic research and theory in social psychology; and college research on student retention. Such extensive empirical evidence, generated by a number of different research methodologies, strongly suggests that cooperative learning should become a major learning strategy at the college level.

# Appendix A

## Sample Cooperative Learning Exercises

The materials in Appendix A are sample exercises used by Jim Cooper in his graduate class "Research Methods in Education." Exercise #1 is given to students on the first day of class following an explanation of the course syllabus and a brief lecture on research methods. It is intended to describe the format to be used in this weekly class, which meets for one three-hour session. The primary focus of the exercise is to assign specific roles to team members and to allow members to learn something about their teammates.

Exercise #2 usually completes the first week's meeting. Having lectured briefly on independent and dependent variables, the students are now required to recognize them in word problems. Once they have completed this task, students within four-person teams work in pairs to construct their own examples of independent and dependent variables. Pairs within teams then critique one another's work. Exercise #2 is a relatively easy task and gives students an early experience of success with the academic content of the course, which Cooper feels is important since Research Methods in Education is viewed with tremendous anxiety by most students in the graduate education program.

Exercise #12 is a much more complicated activity which is assigned during the last cooperative learning session. The complexity of the exercises have been "shaped" from the relatively simple assignments given during the first few weeks of the course. In later exercises, students are expected to synthesize material learned during the previous weeks of the course. In exercises #10 and #11 students were asked to construct a two-year action-research plan for a medium-sized school district, of which the professor is the hypothetical superintendent. Teams have to construct goals and objectives, sampling procedures, group research designs, threats to internal validity, and the like. Taken together, exercises #10 and #11 become a formal district plan for an Effective Teaching proposal to be submitted for funding to the Carnegie Foundation. In exercise #12, teams review one another's proposals, based on criteria supplied by the teacher. This exercise (along with exercises #10 and #11) allows team members to synthesize many of the skills developed earlier in the course.

# Team Learning Exercise #1
# Team Building

As an adjunct to the lectures and other activities in Research Methods in Education, we will be engaged in a series of "team learning" activities, roughly based on a Cooperative Learning procedure known as "Student Teams Achievement Division." One major purpose of these team learning activities is to give you additional practice concerning the skills and concepts presented in the readings and in the lectures. A critical dimension of this procedure is the concept of student interdependence. That is, I would like you to develop a sense during these exercises that you are responsible for one another's mastery of the content.

Generally speaking, I will lecture for 75-100 minutes during each class period. Then I will give each learning team a set of problems or topics to resolve. It is your task to work among yourselves to come up with the solutions to the problems. Most of the team learning time should be spent in *verbalizing* solutions to problems and engaging in a dialogue. *Do not* work the problems silently, then compare answers (unless there are compelling reasons to do so).

When you have completed the team learning exercises, raise your hands. I will come over and check your work. Sometimes the checking will simply involve examining the work sheet and asking you a few questions of explanation. At other times I may examine the work sheet, then ask all four members to take a brief exam over items similar to those on the work sheets. Another alternative that I might use would be where I roll dice and one of your team will take an exam for all members of your team. You will only get team learning points on days that I give a short exam if performance is satisfactory on the exam. So don't be in a hurry to finish the exercise — ensure that all members of your team understand *why* an answer is correct before moving on to the next problem. If I detect that your team is simply rushing to get done or if anyone on your team is not being assisted when he/she is having difficulty, I will be very unhappy with all members of your team.

The first exercise is not an academic exercise but rather a means of allowing you to get to know one another. I would like you to do the following:

1. Introduce yourselves to one another. Include in your introduction your name, the program that you are enrolled in here at Cal State Dominguez Hills, where you went to high school, college and any other teacher training or post-BA work. Then briefly describe your history as a teacher or any other work experience. Finally, list your favorite athletic teams (mine are the University of Michigan, the University of Iowa, and the Detroit Tigers). If you feel comfortable doing so, you may wish to exchange phone numbers, in case someone misses a class, etc. Team Member A is responsible for ensuring that this process proceeds smoothly, that everyone stays on task, and that everyone contributes in roughly equal amounts. Among other functions, it will be Member A's function throughout the term to ensure that the group runs smoothly and that no one dominates the discussion or fails to make a significant contribution to each Team Learning exercise. If anything goes wrong in your team, it will be Member A whom I will yell at. If Member A is absent, Member B takes over responsibility—and I will yell at Member B if your team has a problem.

2. Once you have introduced yourselves to one another, you must come up with a name for your team. Other teams taking Research Methods have called themselves "The A Team," "The Equal Sexes," and "The Fabulous Four." Record this name on the Team Learning sheets that each of you has been given.

3. Now you are ready to do the team learning exercise given to you by kindly Dr. Cooper.

## RULES OF TEAM LEARNING

A. Everyone must contribute—no sandbaggers or dominators allowed. Member A must ensure this.

B. You are responsible for one another—help each other out.

C. You can criticize an idea, but not the person. Disagreements with specific answers or opinions are fine, but disparaging the person or his/her ancestry is not.

D. Each person must take attendance for the whole team every time we do a team learning exercise. These forms will be handed in at the end of the term. If you miss 0, 1, or 2 team learning exercises, neither you nor your team will be penalized. On the third absence, and all subsequent absences, the absent person will lose one of the three possible bonus points for team learning. The team will never be penalized for the absence of a member.

E. The purpose of these exercises is not to finish first, but to allow *everyone* to acquire mastery of the concepts. If I see that teams are rushing just to get done quickly, I will take appropriate remedial action—especially with regard to Member A.

## ROLES OF EACH TEAM MEMBER

**Member A—Team Leader**—Overall supervision of team—must get team involved in learning activities quickly, ensure that all members contribute to discussion and ultimately resolve any conflicts or problems within team (with input from other members).

**Member B—Assistant Team Leader**—Assumes functions of Member A in absence of A. Also responsible for completing forms and study sheets at end of each team learning exercise in a way that reflects the thinking of all team members.

**Member C—Record Keeper**—Keeps record of all materials, assignments, etc., both in team learning and in lecture. If a student misses a class, Member C informs absent student of lecture and team learning activities. Also records all absences during team learning.

**Member D**—Assumes all roles of Member C if C is absent. Is also responsible for assuring that all members of team agree on each problem assigned in team learning exercise and that each team member can verbalize the reasoning behind each solution to each problem. I am less interested in your getting the items correct on the team learning activities than I am in your understanding *why* each answer is correct. This is critical since the test at the end of each unit will consist of different items which will assess understanding of the concept being evaluated.

# Team Exercise #2
# Independent and Dependent Variables

1. Recognition of independent and dependent variables.

A. For each of the following examples, underline the independent variable once and the dependent variable twice:

I. A teacher of research methods at Cal State Dominguez Hills randomly assigns half of his Research Methods class to receive Cooperative Learning and half to receive a traditional lecture approach to teaching the class, then compares the two groups on their final exam score.

II. A third-grade teacher randomly assigns 10 of her students to a reading group which receives computer-assisted instruction, another 10 students to receive Direct Instruction, and a third group of ten to receive Cooperative Learning. At the end of the year she compares the scores of the three groups on the reading sub-scale of the CTBS.

III. A high school counselor wished to compare four different counseling procedures in terms of their effects on student retention in high school. She assigns 100 students to each of the four counseling procedures during the students' sophomore year, then observes the relative retention rates for the four different groups during the next two years.

IV. An elementary school principal wants to see if the literature on Cooperative Learning is correct in asserting that minority youngsters are particularly affected by Cooperative Learning. So she has several volunteer teachers teach cooperatively to some students and traditionally to other students. Thirty of the students in each of the two forms of instruction are Hispanic, 30 are black and 30 are white. Based on CTBS scores at the end of the year, she finds that Hispanic and black students do much better under Cooperative Learning and that white students do somewhat better.

V. A special education teacher wanted to compare behavior modification with more traditional ways of teaching severely handicapped kids, so she taught 15 kids using each of these two procedures and measured two different outcome measures. One outcome measure was motor skill, and the other was liking for school as measured by school attendance.

VI. A football coach had a theory that blocking low (i.e., below the belt) was more effective than blocking high (above the belt) on kick-off returns. Therefore, he had his team block high for half of the team's practice kicks during preseason training and block low for the other half of the kicks, and observed that the return team gained an average of 16 yards per kick on high blocking conditions and 22 yards per kick under low blocking conditions.

VII. A bilingual coordinator assigned half of his Hispanic students to receive either a "dual" language form of bilingual instruction or an immersion approach. Half of the students in each instructional approach were totally non-English speakers and half were limited English speakers. At the end of the year she gave a test of English language proficiency.



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VIII. A counselor wanted to compare a Transactional Analysis approach of dealing with troubled senior high school students with a more behavioral form of counseling, so she and her colleagues used both approaches in counseling two groups of 50 kids each. Twenty-five of the kids in each group were boys and 25 were girls. At the end of the year she measured number of disciplinary referrals and found that the two approaches were equally effective for boys but that Transactional Analysis worked better for the girls.

IX. NOTE TO STUDENTS. If you are working in pairs, go over the previous eight items with your teammate. Once the two of you have agreed on all eight responses, I want each pair to construct three original test items. These items should contain one independent and one dependent variable. The examples should be from your own area (e.g., special education, educational administration, bilingual, etc.) and must be totally original in the sense that you cannot use the examples that I have used in class or on any work sheets. When both pairs of students have constructed three test items, exchange the items and critique for clarity and accuracy.

# Team Learning Exercise #12
# Peer Review of Action Research Proposal

At the heart of research and evaluation is the concept of peer review. The Cooper and Greiner article and the other articles that you read for Activities 1 and 2 in Units 1 and 2 were reviewed by other educational psychologists and professors who had to assess whether each article was worthy of publication. Similarly, the major funding agencies, such as Carnegie, the National Institute for Education, the National Science Foundation, and most others, determine which grants will be funded and which will not be funded by assembling a panel of professionals in the field. Each panel develops a set of criteria and makes decisions by working cooperatively as a group to select the small percentage of the submitted grant applications which will receive funding.

I have been on both sides of this process, as a person submitting articles and grants, and as a reviewer of submitted articles and grant proposals. Now that you have served as "authors" of a two-year grant proposal to the Carnegie Foundation working for kindly Superintendent Cooper, I want you to serve as a review panel for my alter ego, Dr. Carnegie.

Specifically, I want you to read another team's materials concerning their Effective Teaching program and to make a series of judgments about the proposal. I want you to read all the goals and all 10 of the objectives and rate the goals and objectives on two criteria. The first criterion is Completeness. That is, do the goals and objectives generally cover the major areas that a two-year Effective Teaching program should cover? You have to assume that when the call for proposals went out, the Carnegie Corporation stipulated that the grants must be for two years and must cover issues relating to effective teaching. So you can't fault the proposal on those grounds. Within that framework, however, you are free to critique other elements of the proposal.

Completeness is generally a breadth judgment that you have to make. The second criterion under goals and objectives is Quality of Objectives. That is, to what extent are the objectives actually related to the general goals and to what extent are these objectives good indicators of important educational outcomes? For example, if one goal of another team's proposal is to increase academic achievement, then an objective that assesses the kids' *attitude* toward school is perhaps not directly related to that objective. Actual performance in school and on standardized tests may be more direct measures of achievement.

You must also critique a third element of each proposal, the element dealing with sampling procedures, research designs, and threats to validity. Here you need to focus only on the five designs (one per goal), the sampling procedures associated with these designs, and the threats related to each design. I want you to assess the overall Quality of Evaluation here. That is, look at the five objectives being evaluated and decide if the designs were generally well matched with the objectives. Will the designs give you the kind of information indicated in the objectives? Is there a good balance between the "strength" of the evaluation designs and the constraints of the real world? We would all like to do strong Experimental Designs, but in the real world of public education, one often has to settle for weaker designs, like the One-Group Pretest-Posttest Design. So in rating the Quality of Evaluation criterion, focus on the match between objective and design and the ability of the authors to balance

good strong designs with real world practicality. Finally, for this criterion, assess whether the authors were able to explicitly identify the major threats to validity for each design. If they overlooked major problems, point those out in your comments section.

The fourth criterion to be used in the present peer review is Clarity. Generally speaking, was the document easy to read? Did it communicate the required technical information without becoming filled with jargon and unreadable prose?

The final criterion to be used in your peer review is an Overall Quality of Proposal criterion. All things considered, was this a proposal which is worthy of funding? Given that (hypothetically) 100 school districts are applying for the 10 awards of $500,000 per award available in the Carnegie Effective Teaching Program, is this a proposal that you feel comfortable supporting? Bear in mind that your colleagues had about five hours to put this document together in this simulation of an activity that in reality would typically extend over several weeks or months.

I would suggest that you begin by having one of your team read the goals and the objectives under each goal. Then, have each team member (privately) rate the first criterion (Completeness) on the five point Likert-scale described on the attached form. Have each member report his/her rating back to the total team, along with a rationale for this rating. Once receiving input from all team members, develop a quantitative rating for the team which reflects a group consensus.

Now the group should direct its attention to the Quality of Objectives criterion. Read each goal and the two objectives under each. Here you should probably discuss each goal and corresponding objective before you rate the overall criteria for this second issue. Having discussed each of the five goals and related objectives as you proceeded through the five, have each person give their overall quantitative assessment at the end of the critique. Once again, do this individually so that one person doesn't dominate the rating. Get a mean rating and go on to the third criterion.

For the third criterion, Quality of Evaluation, read each objective and the design explanation and threats associated with each. Discuss each before moving on to the next objective and design. As with each of the previous criteria, you are expected to make comments in support of each general rating. On the attached form, there are spaces for documenting/supporting your team rating. Generally, they will take the form of Strengths and Weaknesses under each criterion. You must support your rating by commenting either in the Strengths or the Weaknesses section for each criterion. Sometimes you may choose to point out both Strengths and Weaknesses for each criterion, but you must always fill out at least one of the sections in support of your rating.

For the Clarity criterion, an overall discussion is in order. You need not treat each goal/objective/design individually. Rather, have each team member privately rate the document as a whole on Clarity, then discuss reasons for your rating. Come to some consensus and assign a team rating for this criterion, as you have done for the previous criteria.

A general discussion is also in order for the last criterion, Overall Quality of Proposal. Have each person rate privately and discuss each person's ratings before assigning a final rating to this criterion. Comments here could include anything, but might include size and appropriateness of the sample, the type of dependent variable chosen for each evaluation design, and other issues not explicitly commented on in the four earlier comment sections.

# Team Learning Exercise #12-A
# Form Sheet for Exercise #12

(To be returned to authors of grant proposal)

Peer Review Panel Members and School District Affiliation

A _____

B _____

C _____

D _____

E _____

_____

I. Criterion #1 COMPLETENESS Rating = ____

Rating Key for all Five Ratings

1 = Exemplary—No significant changes required
2 = Good—Generally above average, some changes required
3 = Adequate—Acceptable, but requiring significant changes
4 = Below Average—Widespread and significant changes required to make proposal acceptable in this area
5 = Unacceptable

Comments justifying rating given above (both strengths and weaknesses, if appropriate)

II. Criterion #2 QUALITY OF OBJECTIVES Rating = ____

Comments justifying rating given above

III. QUALITY OF EVALUATION Rating = ____

Comments justifying rating given above

IV. CLARITY Rating = ____

Comments justifying rating given above

V. OVERALL QUALITY OF PROPOSAL Rating = ____

Comments justifying rating given above—final summary comments (overall assessment of proposal quality)

SPECIFIC SUGGESTIONS TO IMPROVE QUALITY OF PROPOSAL

A.

B.

C.

AMOUNT OF INITIAL GRANT REQUEST = $500,000

FUNDING DECISION OF REVIEW PANEL =

A. Full funding

B. Partial funding
(amount of partial funding = _____ )

C. Not funded

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# Notes

We are most interested in disseminating information on the practice of cooperative learning to colleagues at both the precollegiate and collegiate levels. We have constructed a number of documents concerning cooperative learning that we would like to share, including a K-12 workbook on cooperative learning, an annotated bibliography of over 40 sources involving college-level applications of the technique, and a variety of other documents and resources. Contact James Cooper, Susan Prescott, Lenora Cook, Lyle Smith, or Randall Mueck by writing to them at CSU Dominguez Hills, 1000 East Victoria Street, Carson, CA 90747, or by calling (213) 516-3522/3524. Joe Cuseo can be reached at Marymount College, Rancho Palos Verdes, CA 90274, or by calling (213) 377-5501.

Those who wish to join the International Association for the Study of Cooperation in Education should write Drs. Ted and Nancy Graves, 136 Liberty Street, Santa Cruz, CA 95060, or call (408) 429-6550.

# Authors

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